

Appl. No. 09/274,979
Supplemental Amendment

IN THE CLAIMS:

Please cancel claims 132-144 and 165-179 and 182 without prejudice or disclaimer, and amend the remaining claims such that the claims read as follows:

Claims 1-144 (Canceled)

145. (Previously Presented) A method of invoking a service at a first machine from a second machine, said method comprising the steps of:

generating a service invocation request message at said second machine in compliance with a markup language-based message encoding wherein said message includes elements representing data items of at least one argument and associated with type labels selected from a group of type labels, said group including at least an array type label indicating that the corresponding element is an array element representing an n-dimensional array containing a plurality of data items, where n is an integer and $n \geq 1$, said message including at least one element associated with said array type label and representing a multi-level nested array where each element nesting level corresponds to a respective dimension of said array; and

transmitting said service invocation request message from said second machine.

146. (Previously Presented) A method of invoking a service at a first machine, comprising the steps of:

receiving at said first machine a service invocation request message generated at a second machine in compliance with a markup language-based message encoding wherein said message includes elements representing data items of at least one argument and associated with type labels selected from a group of type labels, said group including at least an array type label indicating that the corresponding element is an array element representing an n-dimensional array containing a plurality of data items, where n is an

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integer and $n \geq 1$, said message including at least one element associated with said array type label and representing a multi-level nested array where each element nesting level corresponds to a respective dimension of said array; and
invoking said service in response to said message.

147. (Previously Presented) A method of invoking a service at a first machine, said method comprising the steps of:

receiving at said first machine a service invocation request;
invoking said service in response to said request; and
transmitting from said first machine a service invocation reply message in compliance with a markup language-based message encoding wherein said message includes elements representing data items of at least one argument and associated with type labels selected from a group of type labels, said group including at least an array type label indicating that the corresponding element is an array element representing an n -dimensional array containing a plurality of data items, where n is an integer and $n \geq 1$, said message including at least one element associated with said array type label and representing a multi-level nested array where each element nesting level corresponds to a respective dimension of said array; and
transmitting said service invocation reply message from said second machine.

148. (Previously Presented) A method of invoking a service at a first machine, said method comprising the steps of:

transmitting a service invocation request from a second machine; and
receiving at said second machine a service invocation reply message in compliance with a markup language-based message encoding wherein said message includes elements representing data items of at least one argument and associated with type labels selected from a group of type labels, said group including at least an array type label indicating that the corresponding element is an array element representing an n -dimensional array containing a plurality of data items, where n is an integer and $n \geq 1$,

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said message including at least one element associated with said array type label and representing a multi-level nested array where each element nesting level corresponds to a respective dimension of said array.

Claims 149-152 (Canceled)

153. (Previously Presented) A method of invoking a service at a first machine from a second machine, said method comprising the steps of:

generating a service invocation request message at said second machine in compliance with a mark-up language-based message encoding wherein said message includes elements representing data items of at least one argument and associated with type labels selected from a group including at least an array type label indicating that the corresponding element is an array element representing an n-dimensional array containing a plurality of data items, where n is an integer and $n \geq 1$, said request message including at least one element associated with said array type label and representing an array of dimension n and further including an array label associated with said at least one element and requiring that all data items represented within said array have the same type as one another; and

transmitting said service invocation request message from said second machine.

154. (Previously Presented) A method of invoking a service at a first machine, comprising the steps of:

receiving at said first machine a service invocation request message generated at a second machine in compliance with a markup language-based message encoding wherein said message includes elements representing data items of at least one argument and associated with type labels selected from a group including at least an array type label indicating that the corresponding element is an array element representing an n-dimensional array containing a plurality of data items, where n is an integer and $n \geq 1$, said request message including at least one element associated with said array type label

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and representing an array of dimension n and further including an array label associated with said at least one element and requiring that all data items represented within said array have the same type as one another; and
invoking said service in response to said message.

155. (Previously Presented) A method of invoking a service at a first machine, said method comprising the steps of:

receiving at said first machine a service invocation request;
invoking said service in response to said request; and
transmitting from said first machine a service invocation reply message in compliance with a markup language-based message encoding wherein said message includes elements representing data items of at least one argument and associated with type labels selected from a group including at least an array type label indicating that the corresponding element is an array element representing an n -dimensional array containing a plurality of data items, where n is an integer and $n \geq 1$, said reply message including at least one element associated with said array type label and representing an array of dimension n and further including an array label associated with said at least one element and requiring that all data items represented within said array have the same type as one another; and
transmitting said service invocation reply message from said second machine.

156. (Previously Presented) A method of invoking a service at a first machine, said method comprising the steps of:

transmitting a service invocation request from a second machine; and
receiving at said second machine a service invocation reply message in compliance with a markup language-based message encoding wherein said message includes elements representing data items of at least one argument and associated with type labels selected from a group including at least an array type label indicating that the corresponding element is an array element representing an n -dimensional array

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containing a plurality of data items, where n is an integer and $n \geq 1$, said reply message including at least one element associated with said array type label and representing an array of dimension n and further including an array label associated with said at least one element and requiring that all data items represented within said array have the same type as one another.

157. (Previously Presented) A method according to any one of claims 153-156, wherein said array label identifies said same type.

158. (Previously Presented) A method according to any one of claims 153-156, wherein said mark-up language is XML, said at least one element is expressed as an XML element, and said array label is expressed as an XML attribute of said XML element such that the dimension n is given by the value of said XML attribute.

159. (Previously Presented) A method according to any one of claims 145-148 and 153-156, wherein said message is an XML document.

160. (Previously Presented) A method according to any one of claims 145-148, wherein said message includes a type label associated with the nesting element at each said element nesting level and designating said nesting element as having an array type.

161. (Previously Presented) A method according to claim 160, wherein said nesting element contains at least one member element representing a data item, with all data items represented by the direct children elements of said nesting element being of the same type as one another.

162. (Previously Presented) A method according to claim 161, wherein said message includes an array label associated with said nesting element and said array label indicates the type associated with all data items represented by said direct children elements.

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163. (Previously Presented) A method according to any one of claims 145-148, wherein said message includes an array label associated with said nesting element and said array label indicates a value of n but does not indicate a size for each of said n dimensions.

164. (Previously Presented) A method according to any one of claims 145-148, wherein said message includes an array label associated with said at least one element and requiring that all data items contained within said array have the same type as one another.

165-179 Canceled

180. (Previously Presented) A method according to claim 164, wherein said array label identifies said same type.

181. (Previously Presented) A method according to any one of claims 145-148, wherein all elements in said message designating data items are associated with type labels.

182 Canceled

183. (Previously Presented) A method of invoking a service at a first machine from a second machine, comprising the steps of:

generating a service invocation request message at said second machine in compliance with a markup language-based message encoding, wherein said message includes plural elements representing data items of at least one argument and associated with type labels selected from an encoding group having a predetermined number of members, including at least a first type label for designating an element containing lexical data, and a second type label for designating an element containing other elements associated with type labels selected from said group, and a third type label for

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designating an element containing other elements associated with type labels selected from said group; and
transmitting said message.

184. (Previously Presented) A method of invoking a service at a first machine, comprising the steps of:

receiving at said first machine a service invocation request message generated at a second machine in compliance with a markup language-based message encoding, wherein said message includes plural elements representing data items of at least one argument and associated with type labels selected from an encoding group having a predetermined number of members, including at least a first type label for designating an element containing lexical data, and a second type label for designating an element containing other elements associated with type labels selected from said group, and a third type label for designating an element containing other elements associated with type labels selected from said group; and
invoking said service in response to said message.

185. (Previously Presented) A method of invoking a service at a first machine, said method comprising the steps of:

receiving at said first machine a service invocation request;
invoking said service in response to said request; and
transmitting from said first machine a service invocation reply message in compliance with a markup language-based message encoding, wherein said message includes plural elements representing data items of at least one argument and associated with type labels selected from an encoding group having a predetermined number of members, including at least a first type label for designating an element containing lexical data, and a second type label for designating an element containing other elements associated with type labels selected from said group, and a third type label for

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designating an element containing other elements associated with type labels selected from said group.

186. (Previously Presented) A method of invoking a service at a first machine, said method comprising the steps of:

transmitting a service invocation request from a second machine; and
receiving at said second machine a service invocation reply message in compliance with a markup language-based message encoding, wherein said message includes plural elements representing data items of at least one argument and associated with type labels selected from an encoding group having a predetermined number of members, including at least a first type label for designating an element containing lexical data, and a second type label for designating an element containing other elements associated with type labels selected from said group, and a third type label for designating an element containing other elements associated with type labels selected from said group.

187. (Previously Presented) A method of invoking a service at a first machine from a second machine, comprising the steps of:

generating a service invocation request message at said second machine in compliance with a markup language-based message encoding, wherein said message includes plural elements representing data items of at least one argument and associated with type labels selected from an encoding group having a predetermined number of members, including at least a first type label for designating an element containing lexical data, and a second type label for designating an element containing other elements associated with type labels selected from said group, said encoding providing a lexical type indicator associated with an element having said first type label and wherein an element associated with said first type label with no lexical type indicator is assumed to contain data of string lexical type; and
transmitting said message.

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188. (Previously Presented) A method of invoking a service at a first machine, comprising the steps of:

receiving at said first machine a service invocation request message generated at a second machine in compliance with a markup language-based message encoding, wherein said message includes plural elements representing data items of at least one argument and associated with type labels selected from an encoding group having a predetermined number of members, including at least a first type label for designating an element containing lexical data, and a second type label for designating an element containing other elements associated with type labels selected from said group, said encoding providing a lexical type indicator associated with an element having said first type label and wherein an element associated with said first type label with no lexical type indicator is assumed to contain data of string lexical type; and
invoking said service in response to said message.

189. (Previously Presented) A method of invoking a service at a first machine, said method comprising the steps of:

receiving at said first machine a service invocation request;
invoking said service in response to said request; and
transmitting from said first machine a service invocation reply message in compliance with a markup language-based message encoding, wherein said message includes plural elements representing data items of at least one argument and associated with type labels selected from an encoding group having a predetermined number of members, including at least a first type label for designating an element containing lexical data, and a second type label for designating an element containing other elements associated with type labels selected from said group, said encoding providing a lexical type indicator associated with an element having said first type label and wherein an element associated with said first type label with no lexical type indicator is assumed to contain data of string lexical type.

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190. (Previously Presented) A method of invoking a service at a first machine, said method comprising the steps of:

transmitting a service invocation request from a second machine; and
receiving at said second machine a service invocation reply message in compliance with a markup language-based message encoding, wherein said message includes plural elements representing data items of at least one argument and associated with type labels selected from an encoding group having a predetermined number of members, including at least a first type label for designating an element containing lexical data, and a second type label for designating an element containing other elements associated with type labels selected from said group, said encoding providing a lexical type indicator associated with an element having said first type label and wherein an element associated with said first type label with no lexical type indicator is assumed to contain data of string lexical type.

191. (New) A method according to any one of claims 183-186, wherein said encoding group includes a fourth type label for designating an element containing other elements associated with type labels selected from said group.

192. (New) A method according to any one of claims 183-186, wherein said encoding group includes a fourth type label for designating an element uniquely identifying another element within a particular message.

193. (New) A method according to any one of claims 183-186, wherein said encoding group includes a fourth type label for designating the absence of data.

194. (New) A method according to claim 192, wherein said encoding group includes a fifth type label for designating the absence of data.

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195. (New) A method according to claim 194, wherein said encoding group includes a sixth type label for designating an element containing other elements associated with type labels selected from said group.

196. (New) A method according to any one of claims 183-186, wherein said third type label designates an element containing an n-dimensional array (where n is an integer such that $n \geq 1$) of elements associated with type labels selected from said encoding group.

197. (New) A method according to any one of claims 183-186, wherein said encoding provides a lexical type indicator associated with an element having said first type label.

198. (New) A method according to claim 197, wherein an element associated with said first type label with no lexical type indicator is assumed to contain data of string lexical type.

199. (New) A method according to claim 197, wherein said mark-up language is XML, said elements are expressed as XML elements, said type labels are expressed as XML element type names, and said lexical type indicator is expressed as an XML attribute on an XML element associated with said first type label, with the lexical type of the data contained in said XML element being designated by the value of said XML attribute.

200. (New) A method according to any one of claims 183-186, wherein said encoding group further includes a fourth type label for designating an element representing a numeric value.

201. (New) A method according to any one of claims 183-186, wherein said encoding group includes multiple type labels each designating a respective different type of lexical data contained in an associated element.

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202. (New) A method according to any one of claims 183-186, wherein said message further includes a semantic label for at least one data item of an argument in said message.

203. (New) A method according to claim 202, wherein said mark-up language is XML, said at least one element is expressed as an XML element, and said semantic label is expressed as the value of an XML attribute on said XML element.

204. (New) A method according to claim 183, wherein said group includes at least a fourth type label and a fifth type label always designating an element containing a data item specifying an ID value, wherein said message associates an element having said fourth type label with an ID value, and wherein said message includes an element associated with said fifth type label which specifies said ID value.

205. (New) A method according to claim 184, wherein said group includes at least a fourth type label and a fifth type label always designating an element containing a data item specifying an ID value, wherein said message associates an element having said fourth type label with an ID value, and wherein said message includes an element associated with said fifth type label which specifies said ID value.

206. (New) A method according to claim 185, wherein said group includes at least a fourth type label and a fifth type label always designating an element containing a data item specifying an ID value, wherein said message associates an element having said fourth type label with an ID value, and wherein said message includes an element associated with said fifth type label which specifies said ID value.

207. (New) A method according to claim 186, wherein said group includes at least a fourth type label and a fifth type label always designating an element containing a data item specifying an ID value, wherein said message associates an element associated with said fourth

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type label with an ID value, and wherein said message includes an element associated with said fifth type label which specifies said ID value.

208. (New) A method according to claim 183, wherein said group includes at least one placeholder type label that designates a placeholder element which represents the absence of data.

209. (New) A method according to claim 184, wherein said group includes at least one placeholder type label that designates a placeholder element which represents the absence of data.

210. (New) A method according to claim 185, wherein said group includes at least one placeholder type label that designates a placeholder element which represents the absence of data.

211. (New) A method according to claim 186, wherein said group includes at least one placeholder type label that designates a placeholder element which represents the absence of data.

212. (New) A method according to any one of claims 208-211, wherein said placeholder element represents a programming language null object reference.

213. (New) A method according to any one of claims 208-211, wherein said placeholder element identifies an element contained elsewhere in said message.

214. (New) A method according to any one of claims 208-211, wherein said message includes a second type label associated with said placeholder element.

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215. (New) A method according to any one of claims 208-211, wherein said message includes a semantic label associated with said placeholder element.
216. (New) A method according to claim 214, wherein said message includes a semantic label associated with said placeholder element.
217. (New) A method according to any one of claims 204-207, wherein said encoding permits any element in a message to be associated with an ID which uniquely identifies said element within said message.
218. (New) A method according to claim 217, wherein said mark-up language is XML, said element is expressed as an XML element, and said ID is associated with said element via an XML attribute on said XML element whose value is said ID.
219. (New) A method according to any one of claims 153-156 or 204-211, wherein all elements of said message representing data items are associated with type labels.